

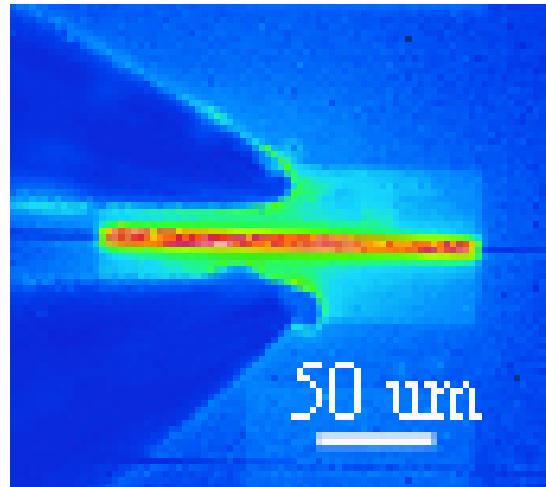
## Novel application of photonic crystals - Optical Isolation for Electrical Contacts

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Placement of electrical contacts that only minimally disrupt the optical signal is a key design consideration for electro-optical devices. This becomes increasingly difficult for high index contrast systems such as Silicon-on-Insulator (SOI) with optical modes highly confined to cross-sections as small as  $\sim 0.1\mu\text{m}^2$ .

We demonstrate an effective method of contacting SOI slab PhC waveguides that achieves effective electrical connection while minimizing optical losses. Metallic contacts are placed laterally 4 rows from the waveguide channel. Here the optical field is attenuated by the PhC lattice by almost 50dB compared to the center of the channel providing excellent optical isolation. Optical transmission measurements performed on PhC waveguides with heavily doped metallized ohmic lateral contacts show losses increased by only 5 dB/cm. The thermo-optic response of these devices was analyzed with the channel acting as a micro-heater. Thermal imaging (see Fig.) of the device showed that the "hot spot" is localized on a micron scale.



**Fig.1** Thermal microscope image of the temperature distribution in PhC waveguide heated with lateral electrical contacts.